A rare complication of kidney biopsy is rupture of a post-biopsy renal pseudoaneurysm. We present a case of a late complication after kidney biopsy. A 42-year-old man 5 days post-renal biopsy presented with severe flank pain. An immediate computed tomography (CT) scan demonstrated acute renal intraparenchymal bleeding from a ruptured pseudoaneurysm. In this case report we present the clinical course of our patient and a literature review of post-renal biopsy bleeding complications, in particular, the rupture of a post-biopsy renal pseudoaneurysm.

Kidney biopsy is an essential procedure in the evaluation and diagnosis of patients with an unknown etiology of kidney diseases. Biopsy is also a tool for the assessment of disease severity and chronicity, which can guide treatment and evaluate prognosis. The introduction of new techniques, such as real-time ultrasonographic guidance and the use of automated biopsy needles, has evolved to improve the safety and the diagnostic yield of the procedure. Although considered safe, kidney biopsy has the greatest risk of post-procedural hemorrhage in comparison to other body sites, as was shown in a retrospective study that included 18,947 biopsies [1].

A pseudoaneurysm occurs due to a penetrating vessel injury. The damaged vessel bleeds and the blood is collected between the two outer layers of an artery: the tunica media and the tunica adventitia. The etiology of a renal artery pseudoaneurysm is usually due to procedures and trauma involving the kidney, such as renal biopsy, partial nephrectomy, and penetrating kidney trauma. Although it is a rare complication of percutaneous renal biopsy, it is hazardous due to its high potential to rupture [2].

**PATIENT DESCRIPTION**

A 42-year-old male with no significant past medical history presented to a clinic with a 1-month history of recurrent episodes of headache, nausea, and vomiting, as well as chest pain, epistaxis, and hematuria that started in 24 hours earlier. His blood pressure was 260/120 mmHg, and an electrocardiogram showed diffuse ST-segment depressions. He was subsequently referred to our hospital with a suspected diagnosis of acute coronary syndrome (ACS). On arrival at the emergency department, his blood pressure was 200/125 mmHg, but his physical exam was otherwise normal. The electrocardiogram showed diffuse ST-segment depressions with no dynamics of ischemic changes on serial electrocardiograms. Routine blood work revealed a potassium level of 3.2 mEq/L, a serum creatinine level of 2.44 mg/dl, and a BUN level of 43 mg/dl, normal white blood cell count, normal platelets with mild normocytic anemia, hemoglobin levels of 12 g/dl, and serial troponin I measurements that were persistently mildly elevated. Urinalysis revealed dysmorphic red blood cells and a protein/creatinine ratio of 1.73 mg/mg. He was hospitalized with a diagnosis of acute glomerulonephritis accompanied by a hypertensive emergency. Intravenous antihypertensive therapy was initiated. His fundoscopic examination revealed signs of grade IV hypertensive retinopathy. A non-contrast CT brain scan was normal, and kidney ultrasound showed the normal size and structure of both kidneys with

**Figure 1.** Computed tomography (CT) images showing a pseudoaneurysm in the lower pole of the left kidney (white arrows) with contrast material extravasation that indicates active bleeding.


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**KEY WORDS:** kidney biopsy, pseudoaneurysm rupture

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mild left hydronephrosis. The patient was evaluated for possible causes of acute glomerulonephritis and secondary hypertension. All were ruled out.

The patient was treated with labetolol, amlodipine, and doxazosin. His blood pressure was controlled, reaching a value of 145/88 mmHg. Nine days after the patient’s admission, a percutaneous kidney biopsy was obtained under ultrasound guidance. His blood pressure on the day of the biopsy was 153/93 mmHg. The procedure was uneventful, and the patient was discharged after 24 hours of observation, during which two complete blood counts were taken with no decrease in the hemoglobin level (Hb12.5 g/dl). The results of the biopsy did not demonstrate any renal pathology consistent with glomerulonephritis. The immunostaining was negative for IgG, IgM, IgA, C3, C4, C1q, and kappa and lambda light chains.

After discharge, the patient's blood pressure was well controlled, his blood test showed a creatinine level of 2.5 mg/dl. He avoided physical work as advised by his physicians. Five days after the biopsy, the patient returned to the emergency department with severe back pain that had started one hour prior to his arrival. On admission, the patient was in severe distress. His blood pressure was 186/141 mmHg and his pulse was 110 beats per minute. His initial hemoglobin level on arrival was 11.9 g/dl. The differential diagnosis was between post-kidney biopsy hemorrhage and aortic dissection, so an urgent CT angiogram was recorded. The CT showed a retroperitoneal hematoma around the left kidney with active bleeding arising from a pseudoaneurysm at the lower pole of the kidney and an active contrast extravasation on a delayed-phase CT scan [Figure 1A, Figure 1B]. At this point the patient’s blood pressure had dropped to 80/50 mmHg, and on repeated complete blood count his hemoglobin level decreased by 2 g/dl in less than one hour to 9.9 g/dl. A massive transfusion protocol was initiated, and the patient was taken urgently to the interventional radiology unit. Successful selective embolization of the accessory left renal artery was performed [Figure 1C]. After the procedure, the patient was hospitalized in the intensive care unit (ICU) for further stabilization and observation. After 24 hours re-bleeding was suspected due to decreases in the blood pressure (108/72 mmHg) and the hemoglobin level (8.5 g/l).

The patient was taken immediately to the interventional radiology unit, and another site of active bleeding from the lower pole of the left kidney was recognized. A second embolization of the accessory left renal artery and small segmental branches of the left renal artery supplying the lower pole of the left kidney was performed with no evidence of residual bleeding after the procedure [Figure 1D]. The patient was hospitalized in the ICU for 3 more days, during which he was hemodynamically stable with no evidence of a decrease in the hemoglobin levels in repeated blood

**Figure 1A.** Contrast-enhanced computed tomography images showing a large left perinephric hematoma (white arrows) with anterior displacement of the left kidney.  

**Figure 1B.** Contrast-enhanced computed tomography images showing a large left perinephric hematoma (white arrows) with anterior displacement of the left kidney.  

**Figure 1C.** Therapeutic angiography. Selective angiography of the left renal artery showing a pseudoaneurysm (white arrow) in the lower pole of the left kidney [A], and active contrast extravasation (white arrow) [B]. Selective embolization of an accessory left renal artery with no additional bleeding [C].
tests, but a rise in the creatinine level up to 3.5 mg/dl was noticed. The patient's medical condition was stabilized, and he was discharged with a creatinine level of 2.6 mg/dl. At the 12-month follow-up, the patient was stable with controlled blood pressure under treatment and a creatinine level of 1.7 mg/dl.

The current case study demonstrates a late severe complication of percutaneous renal biopsy, probably due to rupture of a pseudoaneurysm.

Percutaneous renal biopsy is a procedure with increased bleeding risk compared to biopsy from other organs, as was demonstrated by Takeuchi et al. [3] who found that the incidence of bleeding events was 1.1% post-native kidney biopsy compared with an incidence of 0.5% in patients who underwent liver biopsy, 0.8% in patients who underwent pancreas biopsy, and 0.1% in patients post lung biopsy.

The predictors for the need of blood transfusions in patients who underwent native kidney biopsy include a bigger needle gauge, female sex, a mean creatinine level ≥ 2.0 mg/dl, pre-biopsy hemoglobin levels < 12 g/dl, and a systolic blood pressure ≥ 130 mmHg [4]. In addition, acute kidney injury (AKI) as an indication for kidney biopsy is another risk factor for major complications, such as bleeding [1]. Our patient presented with both AKI with creatinine > 2 mg/dl and high blood pressure.

Most of the bleeding after kidney biopsy occurs in the first 24 hours after the biopsy.

One of the rare causes of hemorrhage due to renal biopsy is rupture of a post-biopsy renal artery pseudoaneurysm. This is a rare complication of renal biopsy that may occur also after laparoscopic partial nephrectomy, percutaneous nephrolithotomy, and traumatic penetrating and blunt renal injuries. Symptoms may include abdominal tenderness, abdominal mass, hematuria, hypertension, and shock. Our patient presented with acute abdominal pain and hypertension with rapid hemodynamic deterioration. There are four spaces where blood from a ruptured pseudoaneurysm can accumulate: retroperitoneal, intraperitoneal, intrarenal, and intrapelvic. Most intraparenchymal renal artery pseudoaneurysm ruptures are self-contained, leading to an increased probability of tamponade and improved mortality. The treatment of choice for this life-threatening injury is early embolization, as performed on our patient. Other options are nephrectomy and open vascular surgery. Both of these procedures are saved for when embolization fails to control the bleeding. Fortunately, in our patient the bleeding of the ruptured pseudoaneurysm was intraparenchymal [Figure 1A, Figure 1B], which allowed early embolization.

The timing of complications is of major importance due to its implications on post-procedural management and the length of observation. Based on current literature, current practice includes observation for a period ranging from 8 hours in low-risk outpatients and up to 24 hours after kidney biopsy in high-risk patients. Very late kidney biopsy complications have been previously described [3,5], but to the best of our knowledge ours is the first report on a patient who developed severe retroperitoneal hemorrhage and hemorrhagic shock 5 days post native PRB with the need for repeated angiographic embolization due to the recurrence of bleeding from an arteriovenous fistula. This case emphasizes the need for individualized risk stratification in patients who underwent kidney biopsy and possibly for prolonged observations for >24 hours in patients with multiple risk factors for post-procedural bleeding and especially uncontrolled hypertension, as was observed in our patient.

CONCLUSIONS

The current case presents a rare late complication of renal biopsy. A renal biopsy may cause a pseudoaneurysm that is prone to late rupture. Awareness to this rare medical condition is lifesaving.

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